

~~09/973,638~~

09/973,638

FILE 'HOME' ENTERED AT 15:55:12 ON 01 APR 2003

=> file biosis medline caplus wpids uspatfull  
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FILE 'BIOSIS' ENTERED AT 15:55:31 ON 01 APR 2003  
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FILE 'USPATFULL' ENTERED AT 15:55:31 ON 01 APR 2003  
CA INDEXING COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)

\*\*\* YOU HAVE NEW MAIL \*\*\*

=> s nanoparticle? or nanosphere? or nanostructure?  
L1 46292 NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?

=> s l1 and oligonucleotide?  
L2 1809 L1 AND OLIGONUCLEOTIDE?

=> s l2 and hybridization  
L3 934 L2 AND HYBRIDIZATION

=> s l3 and (substrate? or solid support?)  
L4 744 L3 AND (SUBSTRATE? OR SOLID SUPPORT?)

=> s l4 and kit  
L5 524 L4 AND KIT

=> s l5 and (nanoparticle? or nanosphere? or nanostructure?) (5a) oligonucleotide?  
L6 98 L5 AND (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?) (5A)  
OLIGONUCLEOTIDE?

=> dup rem l6  
COMMAND INTERRUPTED

If this message appears repeatedly, please notify the Help Desk.  
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Desk by telephone or via SEND in the STNMAIL file.

=> d his

(FILE 'HOME' ENTERED AT 15:55:12 ON 01 APR 2003)

FILE 'BIOSIS, MEDLINE, CAPLUS, WPIDS, USPATFULL' ENTERED AT 15:55:31 ON  
01 APR 2003

L1 46292 S NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?  
L2 1809 S L1 AND OLIGONUCLEOTIDE?  
L3 934 S L2 AND HYBRIDIZATION  
L4 744 S L3 AND (SUBSTRATE? OR SOLID SUPPORT?)  
L5 524 S L4 AND KIT

09567863

L6 98 S L5 AND (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?) (5A)

=> dup rem 16

COMMAND INTERRUPTED

If this message appears repeatedly, please notify the Help Desk.

Enter "HELP STN" for information on contacting the nearest STN Help

Desk by telephone or via SEND in the STNMAIL file.

=> s 16 and array?

L7 71 L6 AND ARRAY?

=> s 17 and type? (4a) (nanoparticle? or nanosphere? or nanostructure?)

L8 34 L7 AND TYPE? (4A) (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTUR  
E?)

=> dup rem 18

PROCESSING COMPLETED FOR L8

L9 34 DUP REM L8 (0 DUPLICATES REMOVED)

=> d 19 bib abs 1-34

L9 ANSWER 1 OF 34 USPATFULL

AN 2003:86172 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Mucic, Robert C., Glendale, CA, UNITED STATES

Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Skokie, IL, UNITED STATES

Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2003059777 A1 20030327

AI US 2001-957313 A1 20010920 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING

Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,

GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US

1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of

Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8060

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of particles  
having oligonucleotides attached thereto. In one embodiment of the  
method, the oligonucleotides are attached to nanoparticles and have  
sequences complementary to portions of the sequence of the nucleic acid.  
A detectable change (preferably a color change) is brought about as a  
result of the hybridization of the oligonucleotides on the nanoparticles  
to the nucleic acid. The invention also provides compositions and kits  
comprising particles. The invention further provides methods of  
synthesizing unique nanoparticle-oligonucleotide conjugates, the  
conjugates produced by the methods, and methods of using the conjugates.  
In addition, the invention provides nanomaterials and nanostructures  
comprising nanoparticles and methods of nanofabrication utilizing  
nanoparticles. Finally, the invention provides a method of separating a

selected nucleic acid from other nucleic acids.

L9 ANSWER 2 OF 34 USPATFULL  
 AN 2003:78438 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2003054358 A1 20030320  
 AI US 2001-975376 A1 20011011 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
 Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 431  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 8059  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB The invention provides methods of detecting a nucleic acid. The methods  
 comprise contacting the nucleic acid with one or more types of particles  
 having oligonucleotides attached thereto. In one embodiment of the  
 method, the oligonucleotides are attached to nanoparticles and have  
 sequences complementary to portions of the sequence of the nucleic acid.  
 A detectable change (preferably a color change) is brought about as a  
 result of the hybridization of the oligonucleotides on the nanoparticles  
 to the nucleic acid. The invention also provides compositions and kits  
 comprising particles. The invention further provides methods of  
 synthesizing unique nanoparticle-oligonucleotide conjugates, the  
 conjugates produced by the methods, and methods of using the conjugates.  
 In addition, the invention provides nanomaterials and nanostructures  
 comprising nanoparticles and methods of nanofabrication utilizing  
 nanoparticles. Finally, the invention provides a method of separating a  
 selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 3 OF 34 USPATFULL  
 AN 2003:71346 USPATFULL  
 TI **Nanoparticles** having oligonucleotides attached  
 thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc.  
 PI US 2003049631 A1 20030313  
 AI US 2001-974500 A1 20011010 (9)

09567863

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 172

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 6565

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise (contacting the nucleic acid with one or more types of  
particles having **oligonucleotides** attached thereto, In one  
embodiment of the method, the **oligonucleotides** are attached to  
**nanoparticles** and have sequences complementary to portions of  
the sequence of the nucleic acid. A detectable change (preferably a  
color change) is brought about as a result of the **hybridization**  
of the **oligonucleotides** on the **nanoparticles** to the  
nucleic acid. The invention also provides compositions and kits  
comprising particles The invention further provides nanomaterials and  
ianostuctures comprising **nanoparticles** and methods of  
nanofabrication utilizing the **nanoparticles**. Finally, the  
invention provides a method of separating a selected nucleic acid from  
other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 4 OF 34 USPATFULL

AN 2003:71345 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2003049630 A1 20030313

AI US 2001-957318 A1 20010920 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8041

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods

comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 5 OF 34 USPATFULL  
 AN 2003:64684 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C, Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2003044805 A1 20030306  
 AI US 2001-981344 A1 20011015 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
 Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 431  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 8061

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

09567863

L9 ANSWER 6 OF 34 USPATFULL  
AN 2003:30222 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Park, So-Jung, Evanston, IL, UNITED STATES  
PI US 2003022169 A1 20030130  
AI US 2001-820279 A1 20010328 (9)  
RLI Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001,  
PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun  
1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-176409P 20000113 (60)  
US 2000-200161P 20000426 (60)  
US 2000-192699P 20000328 (60)  
US 2000-254392P 20001208 (60)  
US 2000-255235P 20001211 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 570  
ECL Exemplary Claim: 1  
DRWN 65 Drawing Page(s)  
LN.CNT 11127

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of particles  
having oligonucleotides attached thereto. In one embodiment of the  
method, the oligonucleotides are attached to nanoparticles and have  
sequences complementary to portions of the sequence of the nucleic acid.  
A detectable change (preferably a color change) is brought about as a  
result of the hybridization of the oligonucleotides on the nanoparticles  
to the nucleic acid. The invention also provides compositions and kits  
comprising particles. The invention further provides methods of  
synthesizing unique nanoparticle-oligonucleotide conjugates, the  
conjugates produced by the methods, and methods of using the conjugates.  
In addition, the invention provides nanomaterials and nanostructures  
comprising nanoparticles and methods of nanofabrication utilizing  
nanoparticles. Finally, the invention provides a method of separating a  
selected nucleic acid from other nucleic acids.F

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 7 OF 34 USPATFULL  
AN 2003:17339 USPATFULL  
TI Methods for detection and quantification of analytes in complex mixtures  
IN Dimitrov, Krassen, Seattle, WA, UNITED STATES  
PI US 2003013091 A1 20030116  
AI US 2001-898743 A1 20010703 (9)  
DT Utility  
FS APPLICATION  
LREP CAMPBELL & FLORES LLP, 4370 LA JOLLA VILLAGE DRIVE, 7TH FLOOR, SAN  
DIEGO, CA, 92122  
CLMN Number of Claims: 84  
ECL Exemplary Claim: 1  
DRWN 1 Drawing Page(s)  
LN.CNT 1751

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides a diverse population of uniquely labeled probes, containing about thirty or more target specific nucleic acid probes each attached to a unique label bound to a nucleic acid. Also provided is a method of producing a population of uniquely labeled nucleic acid probes. The method consists of (a) synthesizing a population of target specific nucleic acid probes each having a different specifier; (b) synthesizing a corresponding population of anti-genedigits each having a unique label, the population having a diversity sufficient to uniquely hybridize to genedigits within the specifiers, and (c) hybridizing the populations of target nucleic acid probes to the anti-genedigits, to produce a population in which each of the target specific probes is uniquely labeled. Also provided is a method of detecting a nucleic acid analyte. The method consists of (a) contacting a mixture of nucleic acid analytes under conditions sufficient for **hybridization** with a plurality of target specific nucleic acid probes each having a different specifier; (b) contacting the mixture under conditions sufficient for **hybridization** with a corresponding plurality of anti-genedigits each having a unique label, the plurality of anti-genedigits having a diversity sufficient to uniquely hybridize to genedigits within the specifiers, and (c) uniquely detecting a hybridized complex between one or more analytes in the mixture, a target specific probe, and an anti-genedigit.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 8 OF 34 USPATFULL  
 AN 2003:13189 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, United States  
 Letsinger, Robert L., Wilmette, IL, United States  
 Mucic, Robert C., Glendale, CA, United States  
 Storhoff, James J., Evanston, IL, United States  
 Elghanian, Robert, Chicago, IL, United States  
 Taton, Thomas A., Chicago, IL, United States  
 PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)  
 PI US 6506564 B1 20030114  
 AI US 2000-603830 20000626 (9)  
 RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999  
 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999  
 Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997  
 PRAI US 2000-200161P 20000426 (60)  
 US 1996-31809P 19960729 (60)  
 DT Utility  
 FS GRANTED  
 EXNAM Primary Examiner: Riley, Jezia  
 LREP McDonnell Boehnen Hulbert & Berghoff  
 CLMN Number of Claims: 42  
 ECL Exemplary Claim: 1  
 DRWN 84 Drawing Figure(s); 47 Drawing Page(s)  
 LN.CNT 5976

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of

synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and **nanostuctures** comprising **nanoparticles** and methods of nanofabrication utilizing **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 9 OF 34 WPIDS (C) 2003 THOMSON DERWENT  
 AN 2002-258024 [30] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
 2003-198491 [19]  
 DNC C2002-076817  
 TI Detecting nucleic acid, useful for diagnosis of genetic, viral or bacterial disease, comprises hybridizing **nanoparticles** with attached **oligonucleotides** to nucleic acid and detecting change brought about by **hybridization**.  
 DC B04 D16  
 IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R C; PARK, S; STORHOFF, J J; TATON, T A  
 PA (NANO-N) NANOSPHERE INC  
 CYC 95  
 PI WO 2002018643 A2 20020307 (200230)\* EN 329p  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
 NL OA PT SD SE SL SZ TR TZ UG ZW  
 W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK  
 DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR  
 KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU  
 SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW  
 AU 2001081248 A 20020313 (200249)  
 ADT WO 2002018643 A2 WO 2001-US25237 20010810; AU 2001081248 A AU 2001-81248  
 20010810  
 FDT AU 2001081248 A Based on WO 200218643  
 PRAI US 2001-820279 20010328; US 2000-224631P 20000811; US 2000-254392P  
 20001208; US 2000-255235P 20001211; US 2001-760500 20010112  
 AN 2002-258024 [30] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
 2003-198491 [19]  
 AB WO 200218643 A UPAB: 20030320  
 NOVELTY - Detecting a nucleic acid (NA) having at least 2 portions comprising:  
 (a) providing **nanoparticles** (NP) with attached **oligonucleotides** (OGN), where OGN has a sequence complementary to the sequence of NA;  
 (b) contacting NA and NP under conditions effective to allow **hybridization** of OGN with NA; and  
 (c) observing a detectable change brought about by **hybridization** of OGN with NA, is new.  
 DETAILED DESCRIPTION - Detecting (M1) a nucleic acid (NA) having at least 2 portions comprising:  
 (a) providing 2 **types** of **nanoparticles** (NP) with attached **oligonucleotides** (OGN), where OGN on type 1 has a sequence complementary to a first portion of the sequence of NA and OGN on type 2 has a sequence complementary to a second portion of the sequence of NA;  
 (b) contacting NA and NP under conditions effective to allow **hybridization** of OGN with NA; and  
 (c) observing a detectable change brought about by



**hybridization** of OGN with NA, is new.

INDEPENDENT CLAIMS are also included for the following:

- (1) a **kit** for carrying out M1;
- (2) an aggregate probe comprising at least 2 types of NP having OGN attached, bound to each other as a result of **hybridization** of OGN and OGN comprises sequence complementary to a portion of NA or a hydrophobic group attached to the NP free end;
- (3) a core probe comprising at least 2 types of NP having OGN attached, bound to each other as a result of **hybridization** of OGN;
- (4) a **substrate** having NP attached;
- (5) a metallic or semiconductor NP having OGN attached, where OGN are labeled with fluorescent molecules at NP free ends;
- (6) a satellite probe comprising a particle having OGN attached and probe OGN hybridized to OGN on NP;
- (7) a method (M2) of nanofabrication comprising:
  - (a) providing a linking OGN having a selected sequence of 2 portions;
  - (b) providing NP having OGN attached, where OGN comprises a sequence complementary to the linking OGN; and
  - (c) contacting linking OGN and NP under **hybridization** conditions so that a desired nanomaterial or **nanosstructure** is formed where NP are held together by OGN connectors;
- (8) nanomaterials or **nanosstructures** composed of NP having OGN attached, where NP are held together by OGN connectors;
- (9) an assembly of containers comprising containers holding NP with OGN attached;
- (10) a NP having a number of different OGN attached;
- (11) separating (M3) a selected NA having 2 portions;
- (12) binding (M4) OGN to charged NP to produce stable NP-OGN conjugates;
- (13) NP-OGN conjugates comprising OGN attached to NP at a surface density sufficient so that the conjugates are stable, where OGN has sequence complementary to a NA or another OGN;
- (14) detecting a NA using the NP-OGN conjugates;
- (15) a method of nanofabrication using the NP-OGN conjugates;
- (16) separating a selected NA using the NP-OGN conjugates;
- (17) NP-OGN conjugates which are NP having OGN attached, where OGN have a covalently bound cyclic disulfide functional group or polythiol functional group that can bind to NP;
- (18) OGN having a covalently bound cyclic disulfide functional group or polythiol functional group that can bind NP; and
- (19) detecting (M5) an analyte in a sample.

USE - The methods are useful for detecting a nucleic acid, separating a selected nucleic acid from others and methods of nanofabrication (all claimed). Detecting analytes such as nucleic acids and proteins are useful for the diagnosis of genetic, bacterial and viral diseases.

ADVANTAGE - The OGN-NP conjugates that use cyclic disulfide linkers improve the sensitivity of diagnostic assays. In particular assays using OGN-NP conjugates prepared using linkers comprising a steroid residue attached to a cyclic disulfide have been found to be approx. 10 times more sensitive than assays employing conjugates prepared using alkanethiols or acyclic disulfides as the linker. The OGN-NP conjugates are stable allowing them to be used directly in PCR solutions. Therefore conjugates added as probes to a DNA target to be PCR amplified can be carried through the 30 or 40 heating cooling cycles of the PCR and are still able to detect the amplicons without opening the tubes. Opening the tubes for addition of probes after PCR can cause serious problems through contamination of the equipment to be used for subsequent tests.

Dwg.0/64

09567863

TI Bio-barcodes based on **oligonucleotide**-modified  
**nanoparticles**  
IN Mirkin, Chad A., Willmette, IL, UNITED STATES  
Park, So-Jung, Evanston, IL, UNITED STATES  
Nam, Jwa-Min, Evanston, IL, UNITED STATES  
PI US 2002192687 A1 20021219  
AI US 2002-108211 A1 20020327 (10)  
RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001,  
PENDING  
PRAI WO 2001-US10071 20010328  
US 2000-192699P 20000328 (60)  
US 2001-350560P 20011113 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 41  
ECL Exemplary Claim: 1  
DRWN 4 Drawing Page(s)  
LN.CNT 2185  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The present invention relates to a screening methods, compositions, and  
kits for detecting for the presence or absence of one or more target  
analytes, e.g. proteins such as antibodies, in a sample. In particular,  
the present invention relates to a method that utilizes reporter  
**oligonucleotides** as biochemical barcodes for detecting multiple  
protein structures or other target analytes in one solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 11 OF 34 USPATFULL  
AN 2002:322449 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002182613 A1 20021205  
AI US 2001-976971 A1 20011012 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 172  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 6563  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of particles  
having **oligonucleotides** attached thereto. In one embodiment of

the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 12 OF 34 USPATFULL  
 AN 2002:322447 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002182611 A1 20021205  
 AI US 2001-966491 A1 20010928 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606  
 CLMN Number of Claims: 190  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 6646

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 13 OF 34 USPATFULL  
 AN 2002:307830 USPATFULL

TI Movement of biomolecule-coated nanoparticles in an electric field  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Chicago, IL, UNITED STATES  
 Taton, Thomas Andrew, Chicago, IL, UNITED STATES  
 Garimella, Viswanadham, Evanston, IL, UNITED STATES  
 Li, Zhi, Evanston, IL, UNITED STATES  
 Park, So-Jung, Evanston, IL, UNITED STATES  
 PI US 2002172953 A1 20021121  
 AI US 2001-927777 A1 20010810 (9)  
 RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001,  
 PENDING Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan  
 2001, PENDING Continuation-in-part of Ser. No. US 2000-603830, filed on  
 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667,  
 filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part  
 of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED  
 Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997,  
 UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-176409P 20000113 (60)  
 US 2000-200161P 20000426 (60)  
 US 2000-192699P 20000328 (60)  
 US 2000-254392P 20001208 (60)  
 US 2000-255235P 20001211 (60)  
 US 2000-224631P 20000811 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
 Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 598  
 ECL Exemplary Claim: 1  
 DRWN 64 Drawing Page(s)  
 LN.CNT 11435  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB The invention provides methods of detecting a nucleic acid. The methods  
 comprise contacting the nucleic acid with one or more types of particles  
 having oligonucleotides attached thereto. In one embodiment of the  
 method, the oligonucleotides are attached to nanoparticles and have  
 sequences complementary to portions of the sequence of the nucleic acid.  
 A detectable change (preferably a color change) is brought about as a  
 result of the hybridization of the oligonucleotides on the nanoparticles  
 to the nucleic acid. The invention also provides compositions and kits  
 comprising particles. The invention further provides methods of  
 synthesizing unique nanoparticle-oligonucleotide conjugates, the  
 conjugates produced by the methods, and methods of using the conjugates.  
 In addition, the invention provides nanomaterials and nanostructures  
 comprising nanoparticles and methods of nanofabrication utilizing  
 nanoparticles. Finally, the invention provides a method of separating a  
 selected nucleic acid from other nucleic acids.  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 L9 ANSWER 14 OF 34 USPATFULL  
 AN 2002:294562 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Chicago, IL, UNITED STATES

09567863

Taton, Thomas A., Chicago, IL, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002164605 A1 20021107  
AI US 2001-966312 A1 20010928 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8066

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of particles  
having oligonucleotides attached thereto. In one embodiment of the  
method, the oligonucleotides are attached to nanoparticles and have  
sequences complementary to portions of the sequence of the nucleic acid.  
A detectable change (preferably a color change) is brought about as a  
result of the hybridization of the oligonucleotides on the nanoparticles  
to the nucleic acid. The invention also provides compositions and kits  
comprising particles. The invention further provides methods of  
synthesizing unique nanoparticle-oligonucleotide conjugates, the  
conjugates produced by the methods, and methods of using the conjugates.  
In addition, the invention provides nanomaterials and nanostructures  
comprising nanoparticles and methods of nanofabrication utilizing  
nanoparticles. Finally, the invention provides a method of separating a  
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 15 OF 34 USPATFULL  
AN 2002:287518 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002160381 A1 20021031  
AI US 2001-975498 A1 20011011 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
PENDING Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan  
1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed  
on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

09567863

CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 5695

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 16 OF 34 USPATFULL  
AN 2002:280028 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002155462 A1 20021024  
AI US 2001-976577 A1 20011012 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8047

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of

synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 17 OF 34 USPATFULL  
 AN 2002:280027 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas Andrew, Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002155461 A1 20021024  
 AI US 2001-976378 A1 20011012 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
 Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 431  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 8052

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 18 OF 34 USPATFULL  
 AN 2002:280025 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002155459 A1 20021024  
 AI US 2001-975062 A1 20011011 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
 Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 431  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 8059

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
 comprise contacting the nucleic acid with one or more types of particles  
 having oligonucleotides attached thereto. In one embodiment of the  
 method, the oligonucleotides are attached to nanoparticles and have  
 sequences complementary to portions of the sequence of the nucleic acid.  
 A detectable change (preferably a color change) is brought about as a  
 result of the hybridization of the oligonucleotides on the nanoparticles  
 to the nucleic acid. The invention also provides compositions and kits  
 comprising particles. The invention further provides methods of  
 synthesizing unique nanoparticle-oligonucleotide conjugates, the  
 conjugates produced by the methods, and methods of using the conjugates.  
 In addition, the invention provides nanomaterials and nanostructures  
 comprising nanoparticles and methods of nanofabrication utilizing  
 nanoparticles. Finally, the invention provides a method of separating a  
 selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 19 OF 34 USPATFULL  
 AN 2002:280024 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002155458 A1 20021024  
 AI US 2001-967409 A1 20010928 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
 3200, CHICAGO, IL, 60606



09567863

CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8059

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 20 OF 34 USPATFULL  
AN 2002:280008 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Chicago, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
Li, Zhi, Evanston, IL, UNITED STATES  
PI US 2002155442 A1 20021024  
AI US 2001-760500 A1 20010112 (9)  
RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
US 2000-176409P 20000113 (60)  
US 2000-213906P 20000626 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 485  
ECL Exemplary Claim: 1  
DRWN 51 Drawing Page(s)  
LN.CNT 8754

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of

synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 21 OF 34 USPATFULL  
 AN 2002:272801 USPATFULL  
 TI Compositions and methods for the therapy and diagnosis of colon cancer  
 IN Stolk, John A., Bothell, WA, UNITED STATES  
 Xu, Jiangchun, Bellevue, WA, UNITED STATES  
 Chenault, Ruth A., Seattle, WA, UNITED STATES  
 Meagher, Madeleine Joy, Seattle, WA, UNITED STATES  
 PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)  
 PI US 2002150922 A1 20021017  
 AI US 2001-998598 A1 20011116 (9)  
 PRAI US 2001-304037P 20010710 (60)  
 US 2001-279670P 20010328 (60)  
 US 2001-267011P 20010206 (60)  
 US 2000-252222P 20001120 (60)  
 DT Utility  
 FS APPLICATION  
 LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
 SEATTLE, WA, 98104-7092  
 CLMN Number of Claims: 17  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 9233

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer, particularly colon cancer, are disclosed. Illustrative compositions comprise one or more colon tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 22 OF 34 USPATFULL  
 AN 2002:265844 USPATFULL  
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002146720 A1 20021010  
 AI US 2001-961949 A1 20010920 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)

09567863

DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8063

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 23 OF 34 USPATFULL  
AN 2002:251128 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002137072 A1 20020926  
AI US 2001-976617 A1 20011012 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8061

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles

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to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 24 OF 34 USPATFULL  
AN 2002:251127 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002137071 A1 20020926  
AI US 2001-974007 A1 20011010 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8063

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 25 OF 34 USPATFULL  
AN 2002:251126 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES

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Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002137070 A1 20020926

AI US 2001-973638 A1 20011010 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8060

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of particles  
having oligonucleotides attached thereto. In one embodiment of the  
method, the oligonucleotides are attached to nanoparticles and have  
sequences complementary to portions of the sequence of the nucleic acid.  
A detectable change (preferably a color change) is brought about as a  
result of the hybridization of the oligonucleotides on the nanoparticles  
to the nucleic acid. The invention also provides compositions and kits  
comprising particles. The invention further provides methods of  
synthesizing unique nanoparticle-oligonucleotide conjugates, the  
conjugates produced by the methods, and methods of using the conjugates.  
In addition, the invention provides nanomaterials and nanostructures  
comprising nanoparticles and methods of nanofabrication utilizing  
nanoparticles. Finally, the invention provides a method of separating a  
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 26 OF 34 USPATFULL

AN 2002:251114 USPATFULL

TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Chicago, IL, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002137058 A1 20020926

AI US 2001-923625 A1 20010807 (9)

RLI Continuation of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED  
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997,  
UNKNOWN

PRAI US 1996-31809P 19960729 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 105

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ECL Exemplary Claim: 1

DRWN 26 Drawing Page(s)

LN.CNT 3903

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 27 OF 34 USPATFULL

AN 2002:243051 USPATFULL

TI Compositions and methods for the therapy and diagnosis of ovarian cancer

IN Algate, Paul A., Issaquah, WA, UNITED STATES

Jones, Robert, Seattle, WA, UNITED STATES

Harlocker, Susan L., Seattle, WA, UNITED STATES

PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)

PI US 2002132237 A1 20020919

AI US 2001-867701 A1 20010529 (9)

PRAI US 2000-207484P 20000526 (60)

DT Utility

FS APPLICATION

LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
SEATTLE, WA, 98104-7092

CLMN Number of Claims: 11

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 25718

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer, particularly ovarian cancer, are disclosed. Illustrative compositions comprise one or more ovarian tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly ovarian cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 28 OF 34 USPATFULL

AN 2002:242791 USPATFULL

TI Compositions and methods for the therapy and diagnosis of colon cancer

IN King, Gordon E., Shoreline, WA, UNITED STATES

Meagher, Madeleine Joy, Seattle, WA, UNITED STATES

Xu, Jiangchun, Bellevue, WA, UNITED STATES

Secrist, Heather, Seattle, WA, UNITED STATES

PA Corixa Corporation, Seattle, WA, UNITED STATES (U.S. corporation)

PI US 2002131971 A1 20020919

AI US 2001-33528 A1 20011226 (10)

RLI Continuation-in-part of Ser. No. US 2001-920300, filed on 31 Jul 2001,

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PENDING  
PRAI US 2001-302051P 20010629 (60)  
US 2001-279763P 20010328 (60)  
US 2000-223283P 20000803 (60)  
DT Utility  
FS APPLICATION  
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
SEATTLE, WA, 98104-7092  
CLMN Number of Claims: 17  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 8083

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer, particularly colon cancer, are disclosed. Illustrative compositions comprise one or more colon tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 29 OF 34 USPATFULL  
AN 2002:235385 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002127574 A1 20020912  
AI US 2001-973788 A1 20011010 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8060

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the

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conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 30 OF 34 USPATFULL  
AN 2002:60922 USPATFULL  
TI Method of detection by enhancement of silver staining  
IN Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
PI US 2002034756 A1 20020321  
AI US 2001-903461 A1 20010711 (9)  
PRAI US 2000-217782P 20000711 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 30  
ECL Exemplary Claim: 1  
DRWN 5 Drawing Page(s)  
LN.CNT 558

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates to a method for amplifying a detection signal by enhancing or promoting the deposition of additional silver in assay detection systems where the formation of a silver spot serves as a reporter for the presence of a target molecule, including biological polymers (e.g., proteins and nucleic acids) and small molecules.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 31 OF 34 USPATFULL  
AN 2002:332594 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, United States  
Letsinger, Robert L., Wilmette, IL, United States  
Mucic, Robert C., Glendale, CA, United States  
Storhoff, James J., Evanston, IL, United States  
Elghanian, Robert, Chicago, IL, United States  
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)  
PI US 6495324 B1 20021217  
AI US 2000-693005 20001020 (9)  
RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999  
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999  
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997  
PRAI US 1996-31809P 19960729 (60)  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Riley, Jezia  
LREP McDonnell Boehnen Hulbert & Berghoff  
CLMN Number of Claims: 21  
ECL Exemplary Claim: 1  
DRWN 62 Drawing Figure(s); 34 Drawing Page(s)  
LN.CNT 4289

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to



**nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 32 OF 34 USPATFULL  
 AN 2002:168347 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, United States  
 Letsinger, Robert L., Wilmette, IL, United States  
 Mucic, Robert C., Glendale, CA, United States  
 Storhoff, James J., Evanston, IL, United States  
 Elghanian, Robert, Chicago, IL, United States  
 PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)  
 PI US 6417340 B1 20020709  
 AI US 2000-693352 20001020 (9)  
 RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999  
 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999,  
 now abandoned Continuation-in-part of Ser. No. WO 1997-US12783, filed on  
 21 Jul 1997  
 PRAI US 1996-31809P 19960729 (60)  
 DT Utility  
 FS GRANTED  
 EXNAM Primary Examiner: Riley, Jezia  
 LREP McDonnell Boehnen Hulbert & Berghoff  
 CLMN Number of Claims: 10  
 ECL Exemplary Claim: 1  
 DRWN 58 Drawing Figure(s); 34 Drawing Page(s)  
 LN.CNT 4214

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 33 OF 34 USPATFULL  
 AN 2002:63683 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, United States  
 Letsinger, Robert L., Wilmette, IL, United States

Mucic, Robert C., Glendale, CA, United States  
 Storhoff, James J., Evanston, IL, United States  
 Elghanian, Robert, Chicago, IL, United States  
 PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)  
 PI US 6361944 B1 20020326  
 AI US 1999-344667 19990625 (9)  
 RLI Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999  
 Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997  
 PRAI US 1996-31809P 19960729 (60)  
 DT Utility  
 FS GRANTED  
 EXNAM Primary Examiner: Riley, Jezia  
 LREP McDonnell Boehnen Hulbert & Berghoff  
 CLMN Number of Claims: 12  
 ECL Exemplary Claim: 1  
 DRWN 58 Drawing Figure(s); 34 Drawing Page(s)  
 LN.CNT 4158

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 34 OF 34 WPIDS (C) 2003 THOMSON DERWENT  
 AN 2001-451868 [48] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-656926 [75]; 2002-258024 [30];  
 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
 2003-198491 [19]  
 DNC C2001-136537  
 TI Detecting a nucleic acid useful in e.g. diagnosing genetic, bacterial or viral diseases, by contacting the nucleic acid with **oligonucleotides** attached to **nanoparticles** and having sequences complementary a portion of the nucleic acid.  
 DC B04 D16  
 IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
 TATON, T A; GARIMELLA, V; LI, Z  
 PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V;  
 (LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC  
 R C; (STOR-I) STORHOFF J J; (TATO-I) TATON T A  
 CYC 94  
 PI WO 2001051665 A2 20010719 (200148)\* EN 229p  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
 NL OA PT SD SE SL SZ TR TZ UG ZW  
 W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM  
 DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC  
 LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE  
 SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW  
 AU 2001032795 A 20010724 (200166)  
 US 200127574 A1 20020912 (200262)  
 US 2002155442 A1 20021024 (200277)

US 6506564 B1 20030114 (200313)  
 ADT WO 2001051665 A2 WO 2001-US1190 20010112; AU 2001032795 A AU 2001-32795 20010112; US 2002127574 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-973788 20011010; US 2002155442 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US 2000-200161P 20000426, Provisional US 2000-213906P 20000626, US 2001-760500 20010112; US 6506564 B1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, US 2000-603830 20000626  
 FDT AU 2001032795 A Based on WO 200151665; US 2002127574 A1 CIP of US 6361944; US 2002155442 A1 CIP of US 6361944  
 PRAI US 2001-760500 20010112; US 2000-176409P 20000113; US 2000-200161P 20000426; US 2000-603830 20000626; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2001-973788 20011010; US 2000-213906P 20000626  
 AN 2001-451868 [48] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]  
 AB WO 200151665 A UPAB: 20030320

NOVELTY - Detecting a nucleic acid having at least 2 portions, comprises contacting the nucleic acid with one or more **types** of **nanoparticles** having **oligonucleotides** attached to the **nanoparticles** and having sequences complementary to portions of the sequence of the nucleic acid.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) methods of detecting a nucleic acid having at least 2 portions comprising:

(a) contacting the nucleic acid with one or more **types** of **nanoparticles** having **oligonucleotides** attached to the **nanoparticles** and having sequences complementary to portions of the sequence of the nucleic acid, under conditions allowing the **hybridization** of the **oligonucleotides** on the **nanoparticles** with the nucleic acid; and

(b) observing a detectable change brought about by **hybridization** of the **oligonucleotides** on the **nanoparticles** with the nucleic acid;

(2) kits comprising at least one container holding a composition containing at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it, where the first type has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second **type** of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid;

(3) an aggregate probe comprising at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it, the **nanoparticles** of the aggregate probe are bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached to them, and at least one of the **nanoparticles** of the aggregate probe having **oligonucleotides** attached to it which have a hydrophobic group on the end not attached to the **nanoparticles**;

(4) a kit comprising a container holding a core probe having at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it and the **nanoparticles** of the core probe is bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached

to them;

(5) a core probe comprising at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it;

(6) a **substrate** having **nanoparticles** attached to it;

(7) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it which are labeled with fluorescent molecule at the end not attached to the **nanoparticle**;

(8) a satellite probe comprising a particle having attached **oligonucleotides**, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**;

(9) methods of nanofabrication;

(10) **nanomaterials** or **nanostructures** composed of **nanoparticles** having **oligonucleotides** attached to it and being held by **oligonucleotide** connectors;

(11) a composition comprising at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it;

(12) an assembly of containers holding **nanoparticles** having **oligonucleotides** attached to them;

(13) a **nanoparticle** having multiple **oligonucleotides** attached to it;

(14) a method of separating a selected nucleic acid having at least 2 portions from other nucleic acid;

(15) methods of binding **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(16) **nanoparticle-oligonucleotide** conjugates which are **nanoparticles** having **oligonucleotides** attached to them, where the **oligonucleotides** are present on the surface of the **nanoparticles** at a surface density sufficient so that the conjugates are stable, and at least some of the **oligonucleotides** have sequences complementary to at least one portion of the nucleic acid or **oligonucleotide** sequence;

(17) **nanoparticles** having **oligonucleotides** attached to them which comprises at least one type of recognition **oligonucleotides** having a sequence complementary to a portion of the nucleic acid sequence, and a type of diluent **oligonucleotides** ; and

(18) methods of detecting a nucleic acid.

USE - The methods are useful for detecting nucleic acids, natural or synthetic, and modified or unmodified. The methods may also be applied in the diagnosis of genetic, bacterial and viral diseases, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, and for monitoring gene therapy. The methods are further useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, for quick identification of an infection to assist in drug prescription, and in homes and health centers for inexpensive first-line screening.

ADVANTAGE - The methods, which are based on observing color change with the naked eye, are cheap, fast, simple, robust (reagents are stable), do not require specialized or expensive equipment, and little or no instrumentation is required.

Dwg.0/46

09567863

=> d his

(FILE 'HOME' ENTERED AT 15:55:12 ON 01 APR 2003)

FILE 'BIOSIS, MEDLINE, CAPLUS, WPIDS, USPATFULL' ENTERED AT 15:55:31 ON  
01 APR 2003

L1 46292 S NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?  
L2 1809 S L1 AND OLIGONUCLEOTIDE?  
L3 934 S L2 AND HYBRIDIZATION  
L4 744 S L3 AND (SUBSTRATE? OR SOLID SUPPORT?)  
L5 524 S L4 AND KIT  
L6 98 S L5 AND (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?) (5A)  
L7 71 S L6 AND ARRAY?  
L8 34 S L7 AND TYPE? (4A) (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUC  
L9 34 DUP REM L8 (0 DUPLICATES REMOVED)

=> s l6 not l9

L10 64 L6 NOT L9

=> dup rem l10

PROCESSING COMPLETED FOR L10

L11 64 DUP REM L10 (0 DUPLICATES REMOVED)

=> s l11 and probe?

L12 64 L11 AND PROBE?

=> s l12 and type? (4a) (nanoparticle? or nanosphere? or nanostructure?)

L13 4 L12 AND TYPE? (4A) (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTUR  
E?)

=> d l13 bib abs 1-4

L13 ANSWER 1 OF 4 WPIDS (C) 2003 THOMSON DERWENT  
AN 2003-198491 [19] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]  
DNC C2003-050804  
TI Detecting nucleic acids having at least 2 portions comprises use of  
**nanoparticles** which have **oligonucleotides** attached to  
them that are complementary to portions of the nucleic acid sequence.  
DC B04 D16  
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A  
PA (NANO-N) NANOSPHERE INC  
CYC 1  
PI US 2002155462 A1 20021024 (200319)\* 130p  
ADT US 2002155462 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-976577 20011012  
FDT US 2002155462 A1 CIP of US 6361944  
PRAI US 2001-976577 20011012; US 1996-31809P 19960729; WO 1997-US12783  
19970721; US 1999-240755 19990129; US 1999-344667 19990625; US  
2000-200161P 20000426; US 2000-603830 20000626  
AN 2003-198491 [19] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]  
AB US2002155462 A UPAB: 20030320  
NOVELTY - Detecting nucleic acid (NA) having at least 2 portions comprises

providing **type** of **nanoparticles** (NP) having attached to **oligonucleotides** (O) ((O) on each NP has a sequence complementary to sequence of at least 2 portions of NA), contacting NA and NP to allow **hybridization** of (O) on NP with 2 or more portions of NA, and observing a detectable change brought about by **hybridization** of (O) on NP with NA.

DETAILED DESCRIPTION - Detecting (M1) nucleic acid (NA) having at least 2 portions by providing a type of NP (I) having **oligonucleotide** (O) attached to it ((O) on each **nanoparticle** has a sequence complementary to sequence of at least 2 portions of NA), contacting NA and NP to allow **hybridization** of (O) on NP with 2 or more portions of NA, and observing a detectable change brought about by **hybridization** of the **oligonucleotides** on the NP with the NA.

INDEPENDENT CLAIMS are included for the following:

(1) an aggregate **probe** comprising at least 2 types of NP having attached to it, where NP are bound to each other as a result of **hybridization** of some of (O) attached to it, which have:

- (a) the sequence complementary to a portion of a NA; or
- (b) a hydrophobic group attached to the end not attached to the NP;

(2) a core **probe** comprising at least 2 types of NP having (O) attached to it, the NP of the core **probe** being bound to each other as a result of the **hybridization** of some of the (O) attached to them;

(3) a **substrate** having NP attached to it;

(4) a metallic or semiconductor NP having (O) attached to it, where (O) is labeled with fluorescent molecules at the ends not attached to NP;

(5) kits and compositions comprising the NP;

(6) nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication using utilizing **nanoparticles**;

(7) a satellite **probe** comprising , a particle having attached **oligonucleotides**, the **oligonucleotides** having a first portion and a second portion, both portions having sequences complementary to portions of the sequence of a nucleic acid, and **probe oligonucleotide** hybridized to the **oligonucleotides** attached to the **nanoparticles**, the **probe oligonucleotides** having a first portion and a second portion, the first portion having a sequence complementary to the sequence of the first portion of the **oligonucleotides** attached to the particles, both portions having sequences complementary to portions of the sequence of the nucleic acid, the **probe oligonucleotides** further having a reporter molecule attached to one end;

(8) an assembly of containers comprising first and second containers having attached (O), and (O) attached to NP having a sequence complementary to (O) attached to NP, in the containers;

(9) a NP (I) having several different attached (O);

(10) separating a selected NA having at least 2 portions from other NAs using 2 or more types of NPs having attached (O);

(11) methods of synthesizing unique NP-(O) conjugates;

(12) NP-(O) conjugate produced by the methods;

(13) methods of using the conjugates for detecting NA having at least 2 portions;

(14) NP having **oligonucleotides** attached to them, the **oligonucleotides** comprising at least one type of recognition **oligonucleotides**, each of the recognition **oligonucleotides** comprising a spacer portion and a recognition portion, the spacer portion being designed so that it is bound to the NP, the recognition portion having a sequence complementary to at least on portion of the sequence of a nucleic acid or another **oligonucleotide**;

(15) NP having **oligonucleotides** attached to them, the

**oligonucleotides** comprising:

(a) at least one type of recognition **oligonucleotides**, each of the types or recognition **oligonucleotides** comprising a sequence complementary to at least one portion of the sequence of a nucleic acid or another **oligonucleotide**; and

(b) a type of diluent **oligonucleotides**; and

(16) a **kit** comprising a container holding NP-(O) conjugates and NP as described above.

USE - (I) is useful for separating a selected nucleic acid having at least 2 portions, from other nucleic acids, and for detecting nucleic acids having at least 2 portions. The MP-(O) conjugates are useful for detecting NA having at least 2 portions. (M1) is useful for detecting nucleic acid having at least 2 portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, for monitoring gene therapy, etc. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, etc.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and do not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows schematic diagram illustrating formation of **nanoparticle** aggregates by combining **nanoparticles** having complementary **oligonucleotides** attached to them, the **nanoparticles** being held together in aggregates has result of the **hybridization** of the complementary **oligonucleotides**.

Dwg.1/41

L13 ANSWER 2 OF 4 WPIDS (C) 2003 THOMSON DERWENT  
 AN 2003-182627 [18] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
 2003-198491 [19]  
 DNC C2003-048104  
 TI Detecting nucleic acids having at least two portions involves use of  
**nanoparticles** which have **oligonucleotides** attached to  
 them that are complementary to portions of the nucleic acid sequence.  
 DC B04 D16  
 IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
 TATON, T A  
 PA (NANO-N) NANOSPHERE INC  
 CYC 1  
 PI US 2002155458 A1 20021024 (200318)\* 130p  
 ADT US 2002155458 A1 Provisional US 1996-31809P 19960729, CIP of WO  
 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
 2000-603830 20000626, US 2001-967409 20010928  
 FDT US 2002155458 A1 CIP of US 6361944  
 PRAI US 2001-967409 20010928; US 1996-31809P 19960729; WO 1997-US12783  
 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US  
 2000-200161P 20000426; US 2000-603830 20000626  
 AN 2003-182627 [18] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
 2003-198491 [19]  
 AB US2002155458 A UPAB: 20030320

**NOVELTY** - Detecting (M1) nucleic acid (NA) having at least two portions involves providing **type of nanoparticles** (NP) attached to **oligonucleotides** (O), where (O) on each NP has a sequence complementary to sequence of at least two portions of NA, contacting NA and NP to allow **hybridization** of (O) on NP with two or more portions of NA, and observing a detectable change brought about by **hybridization** of (O) on NP with NA.

**DETAILED DESCRIPTION** - Detecting (M1) NA having at least two portions can optionally be carried out any of the following methods:

(a) contacting the NA with at least two types of NP having (O) attached to it, (O) on the first type of NP having a sequence complementary to a first portion of the sequence of the NA, the (O) on the second type of NP having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow **hybridization** of the (O) on the NP with the NA, and observing a detectable change brought about by **hybridization** of (O) on NP with the NA;

(b) providing a **substrate** having a first type of NP attached to it, the NP having attached to (O), the (O) having a sequence complementary to a first portion of the sequence of a NA to be detected, contacting the NA with the NP attached to the **substrate** under conditions effective to allow **hybridization** of the (O) on the NP with the NA, providing a second type of NP having attached **oligonucleotides**, (O) having a sequence complementary to one or more other portions of the sequence of the NA, contacting the NA bound to the **substrate** with the second type of NP to allow **hybridization** of the (O) on the second type of NP with the NA and observing a detectable change. Optionally, before carrying the detecting step, the method involves providing a binding **oligonucleotide** having a selected sequence having at least two portions, the first portion being complementary to at least a portion of the sequence of the (O) on the second type of NP, contacting the binding **oligonucleotide** with the second type of NP bound to the **substrate** to allow **hybridization** of the binding **oligonucleotide** to the (O) on the NP, providing a third type of NP having attached (O), the (O) having a sequence complementary to the sequence of a second portion of the binding **oligonucleotide**, contacting the third **type of nanoparticle** with the binding **oligonucleotide** bound to the **substrate** to allow **hybridization** of the NP; and

(c) contacting a NA to be detected with a **substrate** having (O) attached to it, the (O) having a sequence complementary to a first portion of the sequence of the NA, the contacting taking place to allow **hybridization** of the (O) on the **substrate** with the NA, contacting the NA bound to the **substrate** with a first type of NP having one or more types of (O) attached to it, at least one of the types of **oligonucleotides** having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow **hybridization** of the (O) on the NP with the NA, contacting the first type of NP bound to the **substrate** with a second type of NP having (O) attached to it, the (O) on the second type of NP having a sequence complementary to at least a portion of the sequence of one of the type of (O) on the first type of NP, the contacting taking place to allow **hybridization** of the (O) on the first and second types of NP, and observing a detectable change.

**INDEPENDENT CLAIMS** are included for the following:

(1) an aggregate **probe** comprising at least two types of NP having attached to it, where NP are bound to each other as a result of **hybridization** of some of (O) attached to it, which have the sequence complementary to a portion of a NA or a hydrophobic group attached to the end not attached to the NP;

(2) a core **probe** comprising at least two types of NP having (O) attached to it, the NP of the core **probe** being bound to each



other as a result of the **hybridization** of some of the (O) attached to them;

(3) a **substrate** having NP attached to it;

(4) a metallic or semiconductor NP having (O) attached to it, where (O) is labeled with fluorescent molecules at the ends not attached to NP;

(5) kits and compositions comprising the NP;

(6) nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication using utilizing **nanoparticles**;

(7) a satellite **probe** comprising a particle having attached **oligonucleotides**;

(8) an assembly of containers comprising first and second containers having attached (O), and (O) attached to NP having a sequence complementary to (O) attached to NP, in the containers;

(9) a NP (I) having several different attached (O);

(10) separating a selected NA having at least two portions from other NAs using two or more types of NPs having attached (O);

(11) methods of synthesizing unique NP-(O) conjugates; NP-(O) conjugate produced by the methods;

(12) methods of using the conjugates for detecting NA having at least two portions;

(13) NP having **oligonucleotides** attached to them;

(14) a **kit** comprising a container holding NP-(O) conjugates and NP as described above.

USE - (I) is useful for separating a selected nucleic acid having at least two portions, from other nucleic acids, and for detecting nucleic acids having at least two portions. The NP-(O) conjugates are useful for detecting NA having at least two portions. (M1) is useful for detecting nucleic acid having at least two portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, and for monitoring gene therapy. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and does not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows schematic diagram illustrating formation of **nanoparticle** aggregates by combining **nanoparticles** having complementary **oligonucleotides** attached to them, the **nanoparticles** being held together in aggregates has result of the **hybridization** of the complementary **oligonucleotides**.

Dwg.1/41

L13 ANSWER 3 OF 4 WPIDS (C) 2003 THOMSON DERWENT

AN 2003-174167 [17] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-182627 [18]; 2003-198491 [19]

DNC C2003-045481

TI Detecting nucleic acid having two portions, by providing **nanoparticles** having **oligonucleotides** attached to it, contacting nucleic acid and **nanoparticles** to allow **hybridization**, and observing detectable change.

DC B04 D16

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;

TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2002146720 A1 20021010 (200317)\* 132p

ADT US 2002146720 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-961949 20010920

FDT US 2002146720 A1 CIP of US 6361944

PRAI US 2001-961949 20010920; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2000-200161P 20000426; US 2000-603830 20000626

AN 2003-174167 [17] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-182627 [18]; 2003-198491 [19]

AB US2002146720 A UPAB: 20030320

NOVELTY - Detecting (M1) nucleic acid having two portions, comprising providing **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to sequence of two portions of nucleic acid, contacting nucleic acid and **nanoparticles**, to allow **hybridization** of **oligonucleotides** with portions of nucleic acid, and observing a detectable change brought about by **hybridization**, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) an aggregate **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** of the aggregate **probe** is bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached to them, and has **oligonucleotides** having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;

(2) a core **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of **hybridization** of some of the **oligonucleotides** attached to it;

(3) a **kit** comprising a container holding a composition comprising two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **oligonucleotides** on the first **type** of **nanoparticles** has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second **type** of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid, and also comprising the core **probe**;

(4) a **substrate** having **nanoparticles** attached to it;

(5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the **nanoparticle**;

(6) a satellite **probe** comprising a particle having **oligonucleotides** attached to it, and **probe** **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the particles, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the **probe**

**oligonucleotide** further has a reporter molecule attached to one end;

(7) a composition comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it;

(8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;

(9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the **nanoparticle**, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;

(10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the **nanoparticles** at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) **oligonucleotides** having a covalently bound cyclic disulfide or polythiol functional group that can bind to the **nanoparticles**;

(13) a **nanoparticle** conjugate for detecting an analyte, comprising **nanoparticles** having **oligonucleotides** bound to it, and **oligonucleotide** having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the **oligonucleotides** bound to the **nanoparticles** and are bound, as a result of **hybridization**, and a linker **oligonucleotide** having two portions;

(14) nonmaterials (III) or **nanostructures** composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors;

(15) a kit for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change; and

(16) a nanomaterial produced, by providing linking **oligonucleotide** comprising two portions, two **types** of **nanoparticles** having **oligonucleotides** attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an **oligonucleotide** bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking **oligonucleotide**, and contacting the first and second **types** of **nanoparticles**, the linking **oligonucleotides** and the complex, to allow **hybridization** of the **oligonucleotides** on the **nanoparticles** to each other and to the linking **oligonucleotide** and the **hybridization** of the **oligonucleotide** of the complexes to the linking **oligonucleotides** so that a desired nanomaterials or **nanostructures** is formed.

USE - M1, (I), (II) and the aggregate **probe** are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for

detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the aggregate **probe** are useful for detecting an analyte (especially polyvalent analyte) in a sample. (All claimed.)

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/41

L13 ANSWER 4 OF 4 WPIDS (C) 2003 THOMSON DERWENT  
 AN 2002-608256 [65] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
 2003-198491 [19]  
 DNC C2002-171859  
 TI Detecting nucleic acid having two portions, by providing  
**nanoparticles** having **oligonucleotides** attached to it,  
 contacting nucleic acid and **nanoparticles** to allow  
**hybridization**, and observing detectable change.  
 DC B04 D16  
 IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R  
 C; PARK, S; STORHOFF, J J; TATON, T A  
 PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V;  
 (LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC  
 R C; (PARK-I) PARK S; (STOR-I) STORHOFF J J; (TATO-I) TATON T A  
 CYC 98  
 PI WO 2002046472 A2 20020613 (200265)\* EN 442p  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
 NL OA PT SD SE SL SZ TR TZ UG ZM ZW  
 W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK  
 DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR  
 KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO  
 RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW  
 AU 2002030593 A 20020618 (200266)  
 US 2002172953 A1 20021121 (200279)  
 ADT WO 2002046472 A2 WO 2001-US46418 20011207; AU 2002030593 A AU 2002-30593  
 20011207; US 2002172953 A1 Provisional US 1996-31809P 19960729, CIP of WO  
 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
 1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US  
 2000-192699P 20000328, Provisional US 2000-200161P 20000426, CIP of US  
 2000-603830 20000626, Provisional US 2000-224631P 20000811, Provisional US  
 2000-254392P 20001208, Provisional US 2000-255235P 20001211, CIP of US  
 2001-760500 20010112, CIP of US 2001-820279 20010328, US 2001-927777  
 20010810  
 FDT AU 2002030593 A Based on WO 200246472; US 2002172953 A1 CIP of US 6361944  
 PRAI US 2001-927777 20010810; US 2000-254392P 20001208; US 2000-254418P  
 20001208; US 2000-255235P 20001211; US 2000-255236P 20001211; US  
 2001-760500 20010112; US 2001-820279 20010328; US 2001-282640P  
 20010409; US 1996-31809P 19960729; WO 1997-US12783 19970721; US  
 1999-240755 19990129; US 1999-344667 19990625; US 2000-176409P  
 20000113; US 2000-192699P 20000328; US 2000-200161P 20000426; US  
 2000-603830 20000626; US 2000-224631P 20000811  
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 AB WO 200246472 A UPAB: 20030320  
 NOVELTY - Detecting (M1) nucleic acid having two portions, involves  
 providing **nanoparticles** having **oligonucleotides**  
 attached to it, which has a sequence complementary to sequence of two  
 portions of nucleic acid, contacting nucleic acid and

**nanoparticles**, to allow **hybridization** of **oligonucleotides** with two or more portions of nucleic acid, and observing a detectable change brought about by **hybridization**.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

- (1) a **kit** comprising a container holding a composition comprising two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **oligonucleotides** on the first **type** of **nanoparticles** has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second **type** of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid;
- (2) an aggregate **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** of the aggregate **probe** is bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached to them, and has **oligonucleotides** having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;
- (3) a core **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of **hybridization** of some of the **oligonucleotides** attached to it;
- (4) a **substrate** having **nanoparticles** attached to it;
- (5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the **nanoparticle**;
- (6) a satellite **probe** comprising a particle having **oligonucleotides** attached to it, and **probe oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the particles, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the **probe oligonucleotide** further has a reporter molecule attached to one end;
- (7) a composition comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it;
- (8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;
- (9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the **nanoparticle**, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;
- (10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;
- (11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the

**nanoparticles** at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) **oligonucleotides** having a covalently bound cyclic disulfide or polythiol functional group that can bind to the **nanoparticles**;

(13) a **nanoparticle** conjugate for detecting an analyte, comprising **nanoparticles** having **oligonucleotides** bound to it, and **oligonucleotide** having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the **oligonucleotides** bound to the **nanoparticles** and are bound, as a result of **hybridization**, and a linker **oligonucleotide** having two portions;

(14) nonmaterials (III) or **nanostructures** composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors;

(15) a **kit** for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change;

(16) a nanomaterial produced, by providing linking **oligonucleotide** comprising two portions, two **types** of **nanoparticles** having **oligonucleotides** attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an **oligonucleotide** bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking **oligonucleotide**, and contacting the first and second **types** of **nanoparticles**, the linking **oligonucleotides** and the complex, to allow **hybridization** of the **oligonucleotides** on the **nanoparticles** to each other and to the linking **oligonucleotide** and the **hybridization** of the **oligonucleotide** of the complexes to the linking **oligonucleotides** so that a desired nanomaterials or **nanostructures** is formed; and

(17) accelerating movement of a **nanoparticle** to an electrode surface.

USE - (M1), (I), (II) and the aggregate **probe** are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the aggregate **probe** are useful for detecting an analyte (especially polyvalent analyte) in a sample (all claimed).

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.  
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